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IS 13109-21 (1991): electronic equipment/systems for use in coal and metalliferrous mines, Part 21: Requirements for mine environmental telemonitoring systems [LITD 8: Electronic Measuring Instruments, Systems and Accessories]

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कोयले तथा धातुमय खानों में उपयोग के लिए इलैक्ट्रानी उपस्कर/तंत्र की विशिष्टि

भाग 21 खदानों के पर्यावरणीय दूर-मानीटरी तंत्र की अपेक्षाएं

Indian Standard

SPECIFICATION FOR ELECTRONIC EQUIPMENT/SYSTEMS FOR USE IN COAL AND METALLIFERROUS MINES

PART 21 REQUIREMENTS FOR MINE ENVIRONMENTAL TELEMONITORING SYSTEMS

UDC 622·489 : 621·395·664

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NEW DELHI 110002

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Price Group 1

Mining Electronics Sectional Committee, LTD 32

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Mining Electronics Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

This standard (Part 21) is part of a series of standards on 'Specification for electronic equipment/ systems for use in coal and metalliferrous mines'.

For the purpose of deciding whether a particular requirement of the standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR ELECTRONIC EQUIPMENT/SYSTEMS FOR USE IN COAL AND METALLIFERROUS MINES

PART 21 REQUIREMENTS FOR MINE ENVIRONMENTAL TELEMONITORING SYSTEMS

1 SCOPE

1.1 This standard covers the requirements for mine environmental telemonitoring systems for use in coal and metalliferrous mines. The standard excludes methane concentration above 5 percent since coal and metalliferrous mines are considered.

1.2 This standard shall be read in conjunction with IS 13109 (Part 1) : 1991.

2 REFERENCES

The following Indian Standard is a necessary adjunct to this standard:

IS No.	*Title*
13109 (Part 1) : 1991	Specification for electronic equipment/systems for use in coal and metalliferrous mines: Part 1 Definitions, general requirements and tests

3 TERMINOLOGY

Provisions of **3** of IS 13109 (Part 1) : 1991 shall apply.

4 GENERAL REQUIREMENTS

4.1 Provisions of **5** of IS 13109 (Part 1) : 1991 shall apply. For the purpose of protection class (IP) in **5.3** of IS 13109 (Part 1) : 1991, this system shall be used as a safety system.

4.2 Each mine environmental telemonitoring system may consist of the following:

1. Telemonitor
2. Central station
3. Power supply unit

4.3 Each mine environmental telemonitoring system shall essentially measure one or more of the following parameters:

a) Methane concentration

b) Oxygen deficiency

c) Carbon monoxide concentration

d) Carbon dioxide concentration

e) Air velocity

f) Temperature

g) Humidity

4.3.1 In addition, the system may have facilities for measurement of sulphur dioxide, hydrogen sulphide and nitrogen oxide concentration as well.

4.4 For mains operated environmental telemonitoring systems, in the event of power failure, systems should be provided with available environmental data.

4.5 The system should be supported with visual display panels/Visual Display Units (VDU) and recorders/printers to monitor and record the desired parameters.

4.6 An audio-visual (blinking) alarm annunciator system shall be provided for instantaneous indication of (a) concentration of methane, (b) carbon monoxide beyond the limits of safe level, and (c) velocity of air flow in the ventilation system, below the acceptable limit.

Limits for the three parameters being as follows:

a) Methane : 1·25 percent

b) Carbon monoxide : 50 ppm

c) Air velocity : 3 m/s (or any other fixed value gap record 4 to 5 m/s)

4.7 Sensors used in the system shall have valid calibration certificates and shall work satisfactorily within the stipulated ranged.

5 SAFETY REQUIREMENTS

Provisions of **6** of IS 13109 (Part 1) : 1991 shall apply.

6 FUNCTIONAL REQUIREMENTS

6.1 The functional requirements shall be as follows:

a) Methane sensor

   i) Measuring range : 0 to 5 percent

   ii) Resolution : 0·01 of full scale division

  - iii) Accuracy : ± 2 percent of full scale division
  - iv) Alarm : Adjustible within the range of 0·5 percent to 1·25 percent of methane
- b) Oxygen sensor
  - i) Measuring range : 5 to 25 percent
  - ii) Accuracy : ± 2 percent of full scale division
- c) Carbon monoxide sensor
  - i) Measuring range : 0 to 100 ppm, with a provision to measure up to 1 000 ppm with a clip-on selector
  - ii) Sensitivity : 1 ppm
  - iii) Accuracy : ± 2 percent of full scale division
- d) Carbon dioxide sensor
  - i) Measuring range : 0·05 to 10 percent
  - ii) Accuracy : ± 2 percent of full scale division
- e) Air velocity sensor
  - i) Measuring range : 0 to 3 m/s with the provision to measure up to 15 m/s
  - ii) Accuracy : ± 5 percent of full scale division
- f) Temperature sensor
  - i) Measuring range : 0 to 70 degree celsius
  - ii) Accuracy : ± 1 percent of full scale division
- g) Relative humidity sensor
  - i) Measuring range : Up to 98 percent
  - ii) Accuracy : ± 2 percent of full scale division
- h) Power supply : Provisions of **5.7** of IS 13109 (Part 1) : 1991 shall apply

6.2 Any additional requirements may also be specified as agreed between purchaser and manufacturer.

7 MARKING

Provisions of **8** of IS 13109 (Part 1) : 1991 shall apply.

8 ENVIRONMENTAL REQUIREMENT

8.1 Provisions of **9** of IS 13109 (Part 1) : 1991 shall apply.

8.2 Endurance Test

The sample shall be switched on and kept under energised conditions for a period of 1 000 hours. Recovery period shall be 1 hour.

8.2.1 All mating parts, which are required to be engaged/disengaged for normal operation of the equipment/systems, shall be engaged/disengaged 500 times under de-energised condition at the rate of 6 to 10 operations per minute. There shall not be any mechanical damage after this test.

9 GENERAL CONDITIONS FOR MEASUREMENT

Provisions of **11** of IS 13109 (Part 1) : 1991 shall apply.

10 TESTS

10.1 Classification of Tests

10.1.1 *Type Tests*

10.1.1.1 Provision of **10.1.1** of IS 13109 (Part 1): 1991 shall apply.

10.1.1.2 After each type test, the sample shall be subjected to functional requirements as specified in **6** of this standard.

10.1.2 *Routine Tests*

The following shall constitute routine tests:

1. Visual examination
2. Functional requirements as specified in **6.1** of this standard
3. Power supply check

10.1.3 *Acceptance Tests*

10.1.3.1 Provisions of **10.1.3** of IS 13109 (Part 1): 1991 shall apply.

10.1.3.2 The following tests shall contitute the acceptance tests:

1. Visual examination
2. Functional requirements as specified in **6.1** of this standard
3. Power supply check
4. Protection against ingress of solid foreign bodies and liquid particles

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